ENERGY AND ENVIRONMENT CABINET

Department for Environmental Protection

Division of Waste Management

(New Administrative Regulation)

401 KAR 48:206. Petroleum contaminated soil treatment facility liner soil layer quality assurance and quality control.

RELATES TO: KRS Subchapters 224.01, 224.10, 224.40, 224.43, 224.99, 322.010(16)

STATUTORY AUTHORITY: KRS 224.10-100, 224.40-305

NECESSITY, FUNCTION, AND CONFORMITY: KRS 224.40-100(19)(c), (24) and (28) requires the cabinet to adopt rules and administrative regulations for the permitting, management, processing or disposal of wastes. KRS 224.40-305 requires that persons engaging in the management, processing, and disposal of waste obtain a permit. This administrative regulation establishes the liner quality assurance and quality control testing requirements for petroleum contaminated soil treatment facilities.

Section 1. Definitions. As used in this administrative regulation:

(1) "Certifying engineer" means the professional engineer that implements the petroleum contaminated soil treatment facility construction quality assurance plan;

(2) "Petroleum contaminated soil" means silt, sand, clay, gravel, or other earthen material; asphalt, concrete, or absorbent materials containing hydrocarbon concentrations above the levels established in 401 KAR 48:205, Section 6, Table 2, but does not exhibit a hazardous characteristic or is not a listed hazardous waste as defined in 401 KAR Chapter 31.

(3) "Petroleum contaminated soil treatment facility" means a solid waste site or facility where petroleum contaminated soil is treated to reduce contaminant concentrations to or below the levels established in 401 KAR 48:205, Section 6, Table 2.

(4) "Quality assurance" means the procedures implemented by the professional engineer to ensure that the construction of the petroleum contaminated soil treatment facility meets design specifications and performance requirements; and

(5) "Quality control" means the system of control implemented by the manufacturer, fabricator, installer, construction contractor, operator or other person in order to meet construction specifications for the construction of the petroleum contaminated soil treatment facility.

Section 2. Applicability. (1) The quality assurance and quality control requirements of this administrative regulation apply to the construction of biopile liners at petroleum contaminated soil treatment facilities.

(2) The liner design requirements for biopiles at petroleum contaminated soil treatment facilities are established in 401 KAR 48:205, Section 3.

Section 3. Specific Subgrade Requirement for Bottom Liners. (1) The petroleum contaminated soil treatment facility liner subgrade is the uppermost in situ rock layer, in situ soil layer, or structural soil fill that shall be graded and prepared for liner construction.

(2) Materials required. The liner subgrade material shall be free of organic material and consist of bedrock, on-site soils, or structural soil fill with the ability to support the maximum load with a minimum factor of safety of two and zero-tenths (2.0).

(3) Construction requirements. (a) The subgrade shall be graded in accordance with the requirements of the approved engineering plans, report, and specifications in the petroleum contaminated soil treatment facility permit;

(b) The material shall be sufficiently dry and structurally sound to ensure that the first lift and all succeeding lifts of structural soil fill placed over the subgrade shall be adequately compacted to the design requirements.

(4) Certification requirements. (a) The certifying engineer shall include in the form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10, a discussion of the reviewed data resulting from the quality assurance and quality control testing required in this section of this administrative regulation.

(b) The results of all testing shall be included in the form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10, including documentation of failed test results, descriptions of the procedures used to repair the failed material, and documentation of retesting performed.

(c) At a minimum, the subgrade shall be inspected in accordance with the following requirements:

1. Before placing material over the subgrade, the certifying engineer shall visually inspect the exposed surface to evaluate the suitability of the subgrade and ensure that the surface is properly compacted, smooth, uniform, and has positive surface drainage;

2. Liner soil subgrade shall be proof-rolled using a fully loaded articulated truck with a fifty-five (55) ton gross vehicle weight;

3. A structural soil fill subgrade shall be tested for density and moisture content at a minimum frequency of nine (9) tests per acre, and constructed in lifts;

4. The subgrade shall be compacted to a density of at least ninety-two (92) percent of the standard proctor;

5. The completed form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10, shall show the finished elevation of the completed subgrade, referenced to existing site control, using a Three Dimensional Terrain Model on Computer Assisted Design Drawing (CADD) or cross-section;

6. The finished elevations shall serve as documentation and reference data for future volume calculations; and

7. Testing shall be performed in accordance with ASTM International standards, or similar method based on the applicable standards of practice for certification by a professional engineer as established in KRS 322.010(16).

Section 4. Specific Soil Support Component Requirements of Compacted Clay Liner (CCL) Systems for Bottom Liners. The Compacted Clay Liner (CCL) component of the bottom liner shall be a continuous layer of low permeability soil constructed to control fluid migration.

(1)(a) Low permeability soil components shall have a maximum remolded coefficient of permeability of 1×10^{-7} centimeters per second.

(b) The soil shall be placed without damaging the collection and removal system components.

(c) The soil material in the top maximum compacted six (6) inch lift shall be free of roots, wood or other decayable materials, and durable rock greater than one-half (1/2) inches in diameter.

(d) The soil material in the bottom lifts shall be free of roots, wood, or other decayable materials, and durable rock greater than two (2) inches in diameter.

(e) The CCL shall contain not more than thirty (30) percent by volume durable rock.

(f) The soils shall be compacted to a minimum of ninety-two (92) percent of the modified or standard proctor density.

(2) Construction requirements. The certifying engineer shall ensure that the soil component of the liner system installation conforms to the following minimum requirements:

(a) 1. Compaction shall be performed by properly controlling the moisture content, lift thickness, and other necessary details to obtain the density, moisture, and permeability characteristics established in this administrative regulation; and

2. The maximum final compacted thickness of each lift of soil material shall be six (6) inches or the thickness necessary to protect the integrity of underlying components and achieve the required liner performance standards.

(b) During construction, the moisture content of the CCL shall be maintained within the range identified in accordance with paragraph (c) of this section to ensure that each remolded lift attains the required minimum permeability.

(c) 1. The layers of the CCL shall be compacted using non-vibratory compactors with full depth penetrating feet with a minimum of six (6) passes per soil layer.

2. a. The compactor ballast shall be adjusted to prevent reaching the desired proctor density with fewer than six (6) passes; and

b. The sheepsfoot length shall be one (1) inch longer than the loose soil layer thickness.

(d) At the end of each work period, the surface shall be sealed from rain infiltration.

(3) Certification requirements. The certifying engineer shall include in the form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10,:

(a) A discussion of required quality assurance and quality control testing; and

(b) The results of testing shall be included in the form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10, including documentation of failed test results, descriptions of the procedures used to correct the improperly installed material, and statements of retesting performed in accordance with the following requirements:

1.a. The certifying engineer shall certify, after review of the quality control testing of the soil layer, that the material meets the requirements of the approved engineering plans, reports, and specifications in the petroleum contaminated soil treatment facility permit.

b. The certifying engineer shall approve and certify the quality assurance testing of all soil liner materials.

c. All quality assurance testing shall be done by the certifying engineer or under the direct supervision of the certifying engineer as established in KRS 322.180(16).

d. The intent of the quality assurance is to ensure the accuracy of the quality control and that the specified material meets the requirements of subsection (1) of this section; and

2. The following quality control tests shall be performed on a minimum of at least one (1) sample from each soil classification:

a. One (1) analysis of soil particle size for every 2,000 cubic yards of soil material;

b. Classification of soils for engineering purposes for each 10,000 cubic yards of soil material;

c. One (1) moisture content test for every 2,000 cubic yards of soil material;

d. One (1) Atterberg limits analysis of plastic and liquid limit and plasticity index in the permit for every 2,000 cubic yards of soil material; and

e.(i) A minimum of one (1) comparison of the moisture-density-permeability relation for every 20,000 cubic yards of soil material; and

(ii) Procedures that comply with the American Society of Civil Engineers paper, "Water Content-Density Criteria for Compacted Soil Liners" by Daniel and Benson, to develop the window of overall acceptable zone of permeability on a graph of dry unit weight versus molding water content.

(d) Quality assurance testing included in this paragraph shall be compared to and evaluated against the quality control testing of paragraph (c) of this subsection if applicable. Quality assurance testing shall include moisture-density testing performed using nuclear methods:

1. At least nine (9) density tests per acre per lift of soil material placed; and

2. A minimum of nine (9) moisture content tests per acre per lift of soil material placed,

(e) All testing shall be performed in accordance with a method based on the applicable standards of practice for certification by a professional engineer as established in KRS 322.010(16).

Section 5. Specific Requirements for the Geosynthetic Clay Liner (GCL) Support Layer for Bottom Liners. The GCL support layer of the bottom liner shall be a continuous layer of cohesive soil constructed to adequately support or protect the geosynthetic clay liner (GCL) and resist puncturing.

(1)(a) The GCL support layer of the bottom liner system shall have a maximum remolded coefficient of permeability of 1×10^{-7} centimeters per second in the laboratory.

(b) The soil shall be placed without damaging the collection and removal system components.

(c) The soil material in the top six (6) inch lift shall be free of roots, wood, or other decayable materials, and durable rock greater than one (1) inch in diameter.

(d) The soil material in the bottom lifts shall be free of roots, wood or other decayable materials, and durable rock greater than two (2) inches in diameter.

(e) The CCL shall contain not more than thirty (30) percent by volume durable rock.

(f) The soils shall be compacted to a minimum of ninety-five (95) percent of the standard proctor density.

(2) Construction requirements. The certifying engineer shall ensure that the support component of the bottom liner system installation conforms to the following minimum requirements:

(a) 1. Compaction shall be performed by controlling the moisture content and lift thickness to obtain the density and moisture window derived using procedures in "Water Content-Density Criteria for Compacted Soil Liners" by Daniel and Benson;

2. The maximum final compacted thickness of each lift of soil material shall be six (6) inches; and

3. The thickness of the initial lift shall be increased as necessary to protect the integrity of underlying components and achieve the required liner performance standards;

(b) To ensure that each lift attains the required density during construction of the support layer, the moisture content of the GCL support component of the bottom liner system shall be maintained within the range identified in accordance with the ASTM D698 - 07e1 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft3 (600 kN-m/m3)"; and

(c) At the end of each work period, the surface shall be sealed from rain infiltration.

(3) Certification requirements. The certifying engineer shall include in the form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10,:

(a) A discussion of required quality assurance and quality control testing; and

(b) The results of all testing shall be included in the form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10, including documentation of failed test results, descriptions of the procedures used to correct the improperly installed material, and statements of retesting performed in accordance with the following requirements:

1. a. The certifying engineer shall certify, after review of the quality control testing of the GCL support layer, if the material meets the requirements of the approved engineering plans, reports, and specifications in the petroleum contaminated soil treatment facility permit; and

b. The quality control testing shall ensure that the specified material meets the density requirements of subsection (1) of this section; and

2. Quality assurance testing shall be based on the applicable standards of practice for certification by a professional engineer as established in KRS 322.010(16), and shall be performed at the following minimum frequency for each soil classification:

a. One (1) analysis of soil particle size for every 4,000 cubic yards of soil material;

b. One (1) analysis of soil classification for engineering purposes for each 20,000 cubic yards of soil material;

c. One (1) moisture content test for every 4,000 cubic yards of soil material;

d. One (1) Atterberg limits analysis of plastic and liquid limit and plasticity index in the permit for every 4,000 cubic yards of soil material placed; and

e. One (1) moisture content test for every 4,000 cubic yards of soil material placed.

(d) Quality assurance testing included in this paragraph shall be compared to and evaluated against the quality control testing established in paragraph (a) of this subsection if applicable. Quality assurance testing shall include:

1. At least nine (9) density tests per acre per lift of soil material placed; and

2. A minimum of nine (9) moisture content tests per acre per lift of soil material placed.

Section 6. Specific Requirements for the Synthetic Liner Soil Support Layer for Bottom Liners. The synthetic liner soil support layer of the bottom liner system shall be a continuous layer of soil constructed to adequately support or protect the synthetic liner.

(1)(a) The synthetic liner support layer of the bottom liner system shall be placed without damaging the collection and removal system components.

(b) The soil material in the top six (6) inch lift shall be free of roots, wood or other decayable materials, and durable rock greater than one (1) inch in diameter.

(c) The soil material in the bottom lifts shall be free of roots, wood or other decayable materials, and durable rock greater than two (2) inches in diameter.

(d) The synthetic liner support layer shall not contain more than thirty (30) percent by volume durable rock.

(e) The soils shall be compacted to a minimum of ninety-two (92) percent of the standard proctor density.

(2) Construction requirements. The certifying engineer shall ensure that the synthetic liner support component of the bottom liner system installation conforms to the following minimum requirements:

(a) 1. Compaction shall be performed by properly controlling the moisture content and lift thickness to obtain the density and moisture characteristics established within the range identified in accordance with the ASTM D698 - 07e1 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)";

2. The maximum final compacted thickness of each lift of soil material shall be six (6) inches. The thickness of the initial lift shall be increased as necessary to protect the integrity of underlying components and achieve the required liner performance standards;

(b) To ensure that each lift attains the required density during construction of the synthetic liner support layer, the moisture content of the synthetic liner support component of the bottom liner system shall be maintained within the range identified in accordance with the ASTM D698 - 07e1 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)"; and

(c) At the end of each work period, the surface shall be sealed from rain infiltration.

(3) Certification requirements. The certifying engineer shall include in the form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10,:

(a) A discussion of required quality assurance and quality control testing; and

(b) The results of testing shall be included in the form DEP 8064, Construction Progress Report for a Petroleum Contaminated Soil Treatment Facility, as incorporated by reference in 401 KAR 47:205, Section 10, including documentation of failed test results, descriptions of the procedures used to correct the improperly installed material, and statements of retesting performed in accordance with the following requirements:

1. a. The certifying engineer shall certify, after review of the quality control testing of the synthetic liner support layer, if the material meets the requirements of the approved engineering plans, reports, and specifications in the permit; and

b. The quality control testing shall ensure that the specified material meets the density requirements of subsection (1) of this section; and

2. Quality assurance testing shall be based on the applicable standards of practice for certification by a professional engineer as established in KRS 322.010(16), and shall be performed at the following minimum frequency for each soil classification:

a. One (1) analysis of soil particle size for every 4,000 cubic yards of soil material;

b. One (1) analysis of soil classification for engineering purposes for each 20,000 cubic yards of soil material; and

c. One (1) moisture content test for every 4,000 cubic yards of soil material placed.

(d) Quality assurance testing included in this paragraph shall be compared to and evaluated against the quality control testing of paragraph (a) of this subsection if applicable. Quality assurance testing shall include:

1. At least nine (9) density tests per acre per lift of soil material; and

2. A minimum of nine (9) moisture content tests per acre per lift of soil material..

Section 7. Incorporation by Reference. (1)(a) The "Water Content-Density Criteria for Compacted Soil Liners" by David E. Daniel, Member, American Society of Civil Engineers (ASCE), and Craig H. Benson, Associate Member, ASCE, *The Journal of Geotechnical Engineering,* Vol. 116, No. 12, December 1990 is incorporated by reference; and

(b) ASTM D698 - 07e1 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)".

(2) The documents listed in this administrative regulation are available from the American Society of Civil Engineers, ASCE World Headquarters, 1801 Alexander Bell Drive, Reston, Virginia 20191-4400 USA, or from their website at http://www.asce.org/asce.cfm.

401 KAR 48:206 approved for filing.

4/14/11
Date

Leonard K. Peters, Secretary
Energy and Environment Cabinet

PUBLIC HEARING AND PUBLIC COMMENT PERIOD: A public hearing on this administrative regulation shall be held on May 23, 2011 at 10:00 A.M. (Eastern Time) at 300 Fair Oaks, Frankfort, KY 40601. Individuals interested in being heard at this hearing shall notify this agency in writing by May 16, 2011, five workdays prior to the hearing, of their intent to attend. If no notification of intent to attend the hearing is received by that date, the hearing may be cancelled. This hearing is open to the public. Any person who wishes to be heard will be given an opportunity to comment on the proposed administrative regulation. A transcript of the public hearing will not be made unless a written request for a transcript is made. If you do not wish to be heard at the public hearing, you may submit written comments on the proposed administrative regulation. Written comments shall be accepted until May 31, 2011. Send written notification of intent to be heard at the public hearing or written comments on the proposed administrative regulation to the contact person.

CONTACT PERSON: Kelli Reynolds
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FISCAL NOTE ON STATE OR LOCAL GOVERNMENT

Regulation No. 401 KAR 48:206 Contact Person: Kelli Reynolds

1. Does this administrative regulation relate to any program, service, or requirements of a state or local government (including cities, counties, fire departments, or school districts)?
Yes _____ No _____
If yes, complete questions 2-4.

2. What units, parts or divisions of state or local government (including cities, counties, fire departments, or school districts) will be impacted by this administrative regulation?

3. Identify each state or federal statute or federal regulation that requires or authorizes the action taken by the administrative regulation.

4. Estimate the effect of this administrative regulation on the expenditures and revenues of a state or local government agency (including cities, counties, fire departments, or school districts) for the first full year the administrative regulation is to be in effect.

(a) How much revenue will this administrative regulation generate for the state or local government (including cities, counties, fire departments, or school districts) for the first year?

(b) How much revenue will this administrative regulation generate for the state or local government (including cities, counties, fire departments, or school districts) for subsequent years?

(c) How much will it cost to administer this program for the first year?

(d) How much will it cost to administer this program for subsequent years?

Note: If specific dollar estimates cannot be determined, provide a brief narrative to explain the fiscal impact of the administrative regulation.
Revenues (+/-):
Expenditures (+/-):
Other Explanation:

REGULATORY IMPACT ANALYSIS AND TIERING STATEMENT

Contact Person: Kelli Reynolds

(1) Provide a brief summary of:

(a) What this administrative regulation does:

This administrative regulation establishes the liner quality assurance and quality control testing requirements for petroleum contaminated soil treatment facilities.

(b) The necessity of this administrative regulation:

This administrative regulation is necessary to establish the liner quality assurance and quality control testing requirements for petroleum contaminated soil treatment facilities.

(c) How this administrative regulation conforms to the content of the authorizing statutes:

This administrative regulation conforms to the content of the authorizing statutes by establishing requirements for liner quality assurance and quality control testing requirements for petroleum contaminated soil treatment facilities, which are a type of solid waste site or facility.

(d) How this administrative regulation currently assists or will assist in the effective administration of the statutes:

This administrative regulation will assist in the effective administrative of statutes by establishing requirements for liner quality assurance and quality control testing requirements for a petroleum contaminated soil treatment facility, which will protect the environment.

(2) If this is an amendment to an existing administrative regulation, provide a brief summary of:

(a) How the amendment will change this existing administrative regulation: NA

(b) The necessity of the amendment to this administrative regulation: NA

(c) How the amendment conforms to the content of the authorizing statutes: NA

(d) How the amendment will assist in the effective administration of the statutes: NA

(3) List the type and number of individuals, businesses, organizations, or state and local governments affected by this administrative regulation:

Businesses that treat petroleum contaminated soils will be affected by this administrative regulation. There are currently 3 permitted by the Solid Waste Branch.

(4) Provide an analysis of how the entities identified in question (3) will be impacted by either the implementation of this administrative regulation, if new, or by the change, if it is an amendment, including:

(a) List the actions that each of the regulated entities identified in question (3) will have to take to comply with this administrative regulation or amendment:

Regulated entities will have to comply with the quality assurance and quality control testing requirements for a petroleum contaminated soil treatment facility. Including specific liner design requirements for bottom liners

(b) In complying with this administrative regulation or amendment, how much will it cost each of the entities identified in question (3):

The cost to implement this type of permit for an existing facility would be approximately $175,000 per acre for the plastic liner and the storage building will be dependent on the size of the building. Groundwater monitoring will not be an additional cost since the existing facilities have monitoring wells already installed.

(c) As a result of compliance, what benefits will accrue to the entities identified in question (3):

As a result of compliance with this administrative regulation, entities will be able to get a permit for a petroleum contaminated soil treatment facility.

(5) Provide an estimate of how much it will cost the administrative body to implement this administrative regulation:

(a) Initially: None

(b) On a continuing basis: None

(6) What is the source of the funding to be used for the implementation and enforcement of this administrative regulation:

This regulation will be implemented and enforced using the solid waste permit fees collected pursuant to 401 KAR 47:090 and general funds.

(7) Provide an assessment of whether an increase in fees or funding will be necessary to implement this administrative regulation, if new, or by the change if it is an amendment:

There will be no increase of fees and no additional funding is necessary to implement this regulation.

(8) State whether or not this administrative regulation established any fees or directly or indirectly increased any fees:

This administrative regulation does not establish any new fees.

(9) TIERING: Is tiering applied? (Explain why or why not)

Tiering is not applied. The quality assurance and quality control testing requirements established in this administrative regulation apply to all petroleum contaminated soil treatment facilities.

Detailed Summary of Material Incorporated by Reference

I. This administrative regulation incorporates by reference the "Water Content-Density Criteria for Compacted Soil Liners" by David E. Daniel, Member, American Society of Civil Engineers (ASCE), and Craig H. Benson, Associate Member, ASCE, *The Journal of Geotechnical Engineering,* Vol. 116, No. 12, December 1990 is incorporated by reference. This document describes methods to determine the permeability of the compacted soil liners.

This document consists of 20 pages.

II. This administrative regulation incorporates by reference the ASTM D698 - 07e1 "Standard Test Methods for Laboratory Compaction Characteristics of Soil Using Standard Effort (12,400 ft-lbf/ft3 (600 kN-m/m3)". This document is used for describing the procedures for testing geonet products for chemical resistance with liquid wastes, prepared chemical solutions, or leachates, or both, derived from solid wastes.

This document consists of 13 pages.